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A WAR TO WIN

The six main species of microorganisms that easily develop resistances to antibiotics are called ESKAPE because of their initials. As well, referring their ability to evade treatments.

Antibiotic resistance is the microorganism's capacity of surviving during a treatment with antibiotics.
Microorganisms can be resistant to one or more antibiotics.

Enterococcus faecium

E. faecium **belongs to the enterococci group. Normally, enterococci are present in gastrointestinal microbiota. However, infection occurs when the number of this group increases.**

They can survive on a lot of surfaces and they are resistant to cleaning products. These characteristics promote a wide distribution in hospital environments.

In 1980, *E. faecium* was sensitive to vancomycin, but in 2007 more than 80% of *E. faecium* became resistant.

Staphylococcus aureus

S. aureus **can be found in different parts of the body. Carriage is asymptomatic and it varies with sex, age or geographic location . However, It is an opportunistic pathogen that can cause from infection to death.**

Penicillin was the first treatment used, but in the 1950s more than 50% of *S. aureus* were resistant to it. Methicillin was the next antibiotic used. Two years later, Methicillin Resistant Staphylococcus aureus (MRSA) were found.

Nowadays, MRSA is over the world. In fact, it is the main infection associated to European hospitals.

Klebsiella pneumoniae

Initially *K. neumoniae* was an important community's pathogen. Few years later, it was established in the hospital environment causing pneumonia and urinary infections.

About 75-88% of clinical infections are associated with *K. pneumoniae*. Furthermore, it can do biofilms (a layer that protects from environment) on medical devices like catheters, which complicates the treatment.

Although most of the infected patients are young, the mortality ranges from 3 to 42%. Moreover, survivors usually have squeals.

Acinetobacter baumannii

A. baumannii **rarely is forming part of human's microbiota. It can affect skin and respiratory tract especially in a military environment or in accidents or wounds.**

This microorganism generates a medical alarm inside Intensive Care Units (ICUs) as well as in immunocompromised individuals. The principal pathologies are pneumonia and meningitis.

In 1970 it have sensitivity to most antibiotics, but nowadays it shows a lot of resistances. The diversity of treatments shows the lack of effective therapy.

Pseudomonas aeruginosa

By the 1980s, *P. aeruginosa* became an important causal agent of pneumonia in hospitals and burn wound infections. Now, it is responsible from 10 to 15% of ICUs infections and between people with chronic lung diseases.

P. aeruginosa **is resistant to different antibiotics, so colistin or combination therapy are some treatment options.**

Hospitalization for patients with susceptible *P. aeruginosa* infections costs 22.116$. However, the cost increases to 54.081$ in the cases of resistance.

Enterobacteriaceae

Enterobacteriaceae **are a group of microorganisms.**
•*Salmonella*: Infection due to uncooked food or contaminated water. The major symptoms are gastroenteritis and fever.

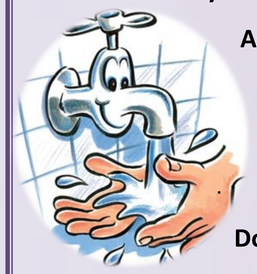
•*Escherichia coli*: It produces an autoinfection. It causes meningitis in neonates, blood and urinary infections.

•*Shigella*: It is rarely founded in microbiota. It can be transmitted by food or contaminated water. It causes 165 milions of infections every year and more than 1 million deaths.

How do you prevent antibiotic resistance?

Antibiotics have been used in a lot of situations. Unfortunately, there are more and more infections without effective treatment due to a bad use. For this reason, we need to use correctly the treatments that we have.

Do not treat yourself, just if the doctor says.



Ask for microbiological tests to make sure it is the right treatment.

Wash your hands to stop infections.

Get vaccinated. It protects against infections.

Do not ask for antibiotics when your doctor thinks they are unnecessary.

Do not re-use. They might loose their efficacy or you may need another treatment.

Take antibiotics prescribed only for you. Treatments are specific for each microorganism.

What should doctors do?

- **Prescribe correctly**: dose, duration and indications.
- **Knowledge** of resistances in their areas.
- **Good use.** New antibiotics only for multiresistance cases.
- **Identify** the pathogen for a good treatment.
- **Hygiene** controls with every patient.

A bit of Juanjo González

Scientific specialized in Clinical Microbiology and Genetics. Nowadays, he is investigating in Vall d'Hebron, Barcelona.

Has Vall Hebron mechanisms to control dissemination of multiresistant pathogens?
First of all, we just prescribe new antibiotics in cases of multiresistance. Afterwards, we analyse samples of risk people to determinate if they have or not multiresistent bacteria.

If you could give an advice, it will be...
As soon as we discover an effective antibiotic, a resistance appears. For this reason, we need to do a good use of antibiotics. Not just people in theirs homes, doctors too.

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